

What is claimed is:

1. A light spot position sensor, comprising:  
a substrate; and

5 a plurality of photosensitive devices arrayed at a certain pitch, formed with semiconductor layers deposited on said substrate, and isolated from each other.

10 2. The light spot position sensor according to claim 1, wherein said plurality of photosensitive devices configures a photosensitive device array arranged one-dimensionally.

15 3. The light spot position sensor according to claim 1, wherein said plurality of photosensitive devices includes a first photosensitive device array arranged on said substrate along a first axis; and

a second photosensitive device array arranged on said first photosensitive device array with an interlayer insulator therebetween, along a second axis different from said first axis.

20 4. The light spot position sensor according to claim 1, further comprising a scanning detector for sequentially scanning output signals from said plurality of photosensitive devices to detect a light spot position.

25 5. The light spot position sensor according to claim 1, further comprising:

an output signal line commonly connected to terminal electrodes of said plurality of photosensitive devices; and

30 a detection circuit connected to said output signal line, wherein a light spot is radiated as a light pulse to determine a light spot position from a delay time of a detection output

from said detection circuit after said light pulse irradiation.

6. A displacement measuring device, comprising:  
a scale having scale markings formed along a measurement  
5 axis;

a sensor head movably arranged relative to said scale along  
said measurement axis for reading said scale markings; and

a state detection system mounted on said sensor head for  
optically detecting a relative positional state of said sensor  
10 head to said scale, wherein said state detection system contains  
a light spot position sensor including

a substrate; and

a plurality of photosensitive devices arrayed at  
a certain pitch, formed with semiconductor layers  
15 deposited on said substrate, and isolated from each other.

7. The displacement measuring device according to  
claim 6, wherein said plurality of photosensitive devices  
configures a photosensitive device array arranged  
20 one-dimensionally.

8. The displacement measuring device according to  
claim 6, wherein said plurality of photosensitive devices  
includes

25 a first photosensitive device array arranged on said  
substrate along a first axis; and

a second photosensitive device array arranged on said first  
photosensitive device array with an interlayer insulator  
therebetween, along a second axis different from said first axis.

30 9. The displacement measuring device according to

claim 6, further comprising a scanning detector for sequentially scanning output signals from said plurality of photosensitive devices to detect a light spot position.

5           10.    The displacement measuring device according to claim 6, further comprising:

          an output signal line commonly connected to terminal electrodes of said plurality of photosensitive devices; and

10           a detection circuit connected to said output signal line, wherein a light spot is radiated as a light pulse to determine a light spot position from a delay time of a detection output from said detection circuit after said light pulse irradiation.

15           11.    The displacement measuring device according to claim 6, wherein said state detection system further includes a light source arranged on said sensor head for providing a light beam entering said light spot position sensor via said scale.

20           12.    The displacement measuring device according to claim 6, wherein said state detection system further includes a state detection means for detecting at least one of a tilt, a gap and an original position of said sensor head to said scale based on a light spot position detected at said light spot position sensor.

25           13.    The displacement measuring device according to claim 11, wherein said light spot position sensor detects rotations in a parallel plane between said sensor head and said scale based on detection of interference fringes.

30           14.    A displacement measuring device, comprising:

a cantilever arranged opposite to a work to be measured and movable along a surface of said work without contacting said work;

5 a light spot position sensor mounted on the tip of said cantilever; and

a light source mounted on the tip of said cantilever for providing a light beam entering said light spot position sensor via said work, said light spot position sensor including

a substrate; and

10 a plurality of photosensitive devices arrayed at a certain pitch, formed with semiconductor layers deposited on said substrate, and isolated from each other.

15 15. The displacement measuring device according to claim 14, wherein said plurality of photosensitive devices configures a photosensitive device array arranged one-dimensionally.

20 16. The displacement measuring device according to claim 14, wherein said plurality of photosensitive devices includes

a first photosensitive device array arranged on said substrate along a first axis; and

25 a second photosensitive device array arranged on said first photosensitive device array with an interlayer insulator therebetween, along a second axis different from said first axis.

30 17. The displacement measuring device according to claim 14, further comprising a scanning detector for sequentially scanning output signals from said plurality of photosensitive devices to detect a light spot position.

18. The displacement measuring device according to claim 14, further comprising:

an output signal line commonly connected to terminal electrodes of said plurality of photosensitive devices; and

a detection circuit connected to said output signal line, wherein a light spot is radiated as a light pulse to determine a light spot position from a delay time of a detection output from said detection circuit after said light pulse irradiation.

19. The displacement measuring device according to claim 14, further comprising a detection means for detecting a surface feature of said work based on a position of said light beam detected at said light spot position sensor, said light beam output from said light source and entering said light spot position sensor via said work.

20. The displacement measuring device according to claim 14, further comprising:

a displacement device arranged on said cantilever for displacing the tip of said cantilever in the direction opposite to said work;

a displacement control means for feedback controlling said displacement device so that a position of said light beam detected at said light spot position sensor always comes to a constant position, said light beam output from said light source and entering said light spot position sensor via said work; and

a detection means for detecting a surface feature of said work based on a feedback signal from said displacement control means to said displacement device.

21. The displacement measuring device according to claim 14, further comprising:

5 a displacement device arranged on said cantilever for displacing the tip of said cantilever in the torsion direction of said cantilever;

10 a displacement control means for feedback controlling said displacement device so that a position of said light beam detected at said light spot position sensor always comes to a constant position, said light beam output from said light source and entering said light spot position sensor via said work; and

a detection means for detecting a surface feature of said work based on a feedback signal from said displacement control means to said displacement device.